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**USING MOODLE - AN OPEN SOURCE VIRTUAL LEARNING
ENVIRONMENT IN THE ACADEMIA**

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ABSTRACT

The technology driven products and services has been in use by the academia in the last decade and achieved lots of popularity throughout the globe to perk up the conventional education system and escalating the education model. As in the report of Bersin et al. 2009, the LMS (Learning Management System) industry represents an \$860 million market which is made up of more than 60 different providers. The virtual learning environment or learning management systems used by universities and colleges allow the mentors to manage their courses and exchange contents with students for a course that in most cases will last several weeks and will meet several times during those weeks. In the corporate world, setting a course may be much

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shorter, completed in a single instructor-led or online session. Hundreds of software applications are available in the software industry to implement virtual learning in the academia and thousands of open source as well as propriety software modules are available to be embedded within these products to deliver and manage instructor-led synchronous and asynchronous online training based on learning object methodology. This paper exemplifies the use of virtual learning technologies to enhance the academic activities for higher education. The paper demonstrates the study and experiments that can be conducted using a famous learning management system MOODLE. The paper also illustrates the outstanding features of a MOODLE LMS which has 949,864 users and hosted in 216 countries throughout the global education industry.

KEYWORDS

Learning Management Systems, Virtual Learning Environment, Asynchronous Learning, E-Learning, Open Source Technology, Virtual Learning Environment, Performance Evaluation, E-Learning Products

INTRODUCTION

Now days, the academic institutions as well as corporate training establishments throughout the globe are using the excellent features of Learning Management Systems (LMS) to heighten the existing model of learning with the development of virtual classrooms, learning environments as well as mobile learning establishments. The higher education institutions are now focusing on the Anytime-Anywhere-Availability (AAA) of faculty members to the learners rather than simply face-to-face classroom teaching. To achieve this goal, LMS or VLE Products are used for the administration, documentation, tracking, reporting of training programs, classroom events, online events, e-learning programs, and training content. As per coverage in different reports and corporate documentations, a robust LMS is able to centralize and automate administration, use

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self-service and self-guided services, assemble and deliver learning content rapidly, consolidate training initiatives on a scalable web-based platform, support portability and standards as well as personalize content and enable knowledge reuse.

The Learning Management Systems typically provides a number of features including -

- User/Participant management and Administration
- Lessons, Courses, Curriculum and Categories management
- Files management and Recovery Remedies
- Exam and Quiz builders
- Assignments builders and evaluation modules
- Communication tools (Forum, Chat, Calendar, Glossary)
- Progress tracking and reporting
- Authentication methods
- Enrollment methods
- Certifications and Reports generators
- Extensibility via Modules
- Payments integration (through Paypal and other Payment Gateways)
- Social tools (Lesson & system history, user wall, user status, Facebook interconnection, twitter)
- Customizable notification system through email
- Skins, Themes and Templates

It also has several features needed in an enterprise environment:

- Organization structure management
- Skills management

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- Job positions management
- Automatic assignment of courses to specific job descriptions
- Skills gap tests management
- User card with training history
- LDAP support

OPEN SOURCE LEARNING MANAGEMENT APPLICATIONS

- aTutor
- Brihaspati
- Claroline
- Chamilo
- DoceboLMS
- Dokeos
- eFront
- ILIAS
- Moodle
- OLAT
- Sakai

COMMERCIAL LEARNING MANAGEMENT APPLICATIONS

- Alphastudy
- Blackboard Learning System
- CERTPOINT Systems Inc.
- Desire2Learn
- QuestionMark

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- CCNet
- eCollege
- Fedena
- GeoLearning
- Gyrus Systems
- HotChalk
- Informetica
- it's learning
- JoomlaLMS
- Learn.com
- Meridian Knowledge Solutions
- Plateau Systems
- Scippo
- SharePointLMS
- SSLearn
- TOPYX
- Thinking Cap LMS
- Vitalect

Here is the description of major network based learning platforms as well as comparative analysis in terms of performance and accessibility.

Name and Latest Release	Architecture Model (Development	Developers	Official Website

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	Language)		
OLAT 6.2.2	Java	University of Zurich in association with the community	www.olat.org
eFront 3.6.5	(LAMP/WAMP) PHP	Epignosis Ltd	efrontlearning.net
ATutor 1.6.4	(LAMP/WAMP) (PHP)	Adaptive Technology Resource Centre, University of Toronto	www.atutor.ca
Moodle 1.9.7	(LAMP/WAMP) (PHP)	Doctor Martin Dougiamas Australia	www.moodle.org
Sakai 2.6.1	J2EE (Java)	University of Michigan, Stanford University, Indiana University	www.sakaiproject.org
Claroline 1.9.1	LAMP (PHP)	University of Leuven, Belgium	www.claroline.net
Dokeos 1.8.6	LAMP (PHP)	Belgium based Community	www.dokeos.net

Table 1: Top E-Learning Management Systems

GLOBAL MARKET AND FUTURE OF E-LEARNING

As per the report in 2009 by American Society for Training and Development (ASTD), 91 percent of respondents are using LMS's in their organizations. E-Learning is experiencing exceptional growth and will continue to do so for the anticipated future. The analysis and forecast released by research firm Ambient Insight bolstered previous research in this area, showing that electronic learning, by dollar volume, reached \$27.1 billion in 2009 and predicting this figure to be double by 2014, with academic institutions leading the way. As per the reports,

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"The Worldwide Market for Self-paced e-Learning Products and Services: 2009-2014 Forecast and Analysis," by 2014, e-learning will reach a dollar volume of \$49.6 billion, representing a compound annual growth rate (CAGR) of 12.8 percent over five years. The dollar figures in the research included expenditures in five categories of electronic learning technologies, or "self-paced e-learning products." These included: packaged content, custom content development services, learning platform and tool hosting services, authoring software and tools, and installed learning platforms.

The chief research officer Sam Adkins at Ambient Insight, clarified that in North America--the largest region for electronic learning--the growth is being driven by academic institutions, both preK-12 and higher education. The report stated, "The largest expenditures for packaged content in 2009 were made by the PreK-12 and higher education buyers, which accounted for 43 percent of all North American purchases. These institutions combined outspend the corporations. The higher education segment will be the largest buyer by the end of the forecast period driven by the robust expansion of online programs in both non-profit and for-profit institutions. The for-profit institutions are experiencing an explosion in demand and they are outspending their non-profit counterparts."

Institution	2009 Online Enrollment Totals	Online Enrollment Growth from 2008 to 2009
University of Phoenix Online	310,400	22%
Kaplan University	68,200	47%
DeVry	56,300	26%
Strayer University	54,300	25%
American Public Education	53,600	49%
Bridgepoint Education	45,500	101%
Walden University	40,500	17%
UMassOnline	40,000	18%
Liberty University	36,200	15%
Education Management	34,800	54%

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Capella Education	33,900	26%
Grand Canyon Education	32,600	53%
University of Maryland University College	30,400	17%

*Source: The Worldwide Market for Self-paced E-Learning Products and Services: 2009-2014
Forecast and Analysis, Ambient Insight, February 2010.*

MOODLE - AN EXCELLENT LEARNING MANAGEMENT SYSTEM

The educational institutes are searching for a secure platform as well a product with all the features which includes all the components that are required in the academia. These components include Online Exams., Quiz, Forums, Chat, Wiki, Blog, Newsletter, Bulletin Board, Content/Course Management System. Hundreds of e-learning products are available in the global learning industry, but the academic establishments are concentrating on open source technologies because of flexibility and efficiency of these products.

The performance of LMS cited here is with reference to the configuration and deployment of a leading Open Source Solution, Moodle™ [*Modular Object Oriented Dynamic Learning Environment*] in the academic institutions.

MOODLE Statistics (As on January 2011)

Current Stable Release - Moodle 2.0.1 +

Themes Available - 170

Modules and Plugins - 700

Language Packs - 85

Online Tests (Mid Semester Internal Assessment Examinations) are one of essential constituent in the overall internal evaluation of engineering students. To conduct the online tests effectively

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and save the resources, there was the need of a software solution capable of handling the online tests for different subjects.

On the basis of market analysis and performance of major LMSs, the online assessment tests can be conducted for all engineering streams on Moodle with the in-built application - Quiz module. The Quiz Activity Module in Moodle LMS is capable to design and set quizzes consisting of a large variety of question types, including multiple choices, true-false, and short answer questions. The questions are kept in the Question bank and can be re-used in multiple tests. The quiz module can display feedback and scores at different times during the quiz, using the review options.

The quiz module has a large number of options and tools to conduct the examination efficiently. To display random questions from a set of question bank is one of the excellent features in Moodle. Quizzes with different question types can be randomly generated from different categories of questions. In addition, there is lot of flexibility in conducting the online tests in Moodle. The Test candidates can be allowed repeated attempts at a question or can also be allowed to retake a quiz multiple times.

Moreover, different presentation methods make the same quiz appear different each time. It can be implemented by customizing the printed format (By Setting the Page Breaks) or by setting the number of questions per page and the questions can be shuffled in regards to presentation order, as well.

MOODLE has a number of formats in which questions can be imported into question bank categories. These formats include some proprietary quiz software formats, as well as text files and the formats available in MOODLE.

Types of Questions in MOODLE

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- Calculated
- Simple Calculated
- Calculated Multichoice
- Description
- Essay
- Matching
- Embedded Answers (Cloze)
- Multiple Choice
- Short-Answer
- Numerical
- Random Short-Answer Matching
- True/False

Question Import Formats in MOODLE

- GIFT
- Moodle XML
- Aiken
- Blackboard
- Blackboard V6+
- WebCT format
- Course Test Manager
- Embedded Answers (Cloze)
- Examview
- Diploma 6

Aiken Format

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Aiken Format can be used to conduct the online examination of any stream. The Aiken format is a very simple way of creating multiple choice questions in a clear human-readable format and user-friendly to work with. Every format in Moodle has some specifications which must be followed to import the questions successfully. In case of Aiken Format, the question statement must be all on one line. Each answer must start with a single-letter character, followed by a period '.' or a bracket ')', then a space. The answer line must immediately follow, starting with "ANSWER: " and then giving the appropriate letter. The answer letters (A, B, C etc.) and the word "ANSWER" must be capitalized as shown otherwise the import will fail.

Here are the examples of the Aiken Format:

What is the correct answer to this question?

A. Incorrect Option 1

B. Incorrect Option 2

C. Incorrect Option 3

D. Correct Option

ANSWER: D

Which LMS has the largest number of quiz import formats?

A) Moodle

B) ATutor

C) Claroline

D) Blackboard

ANSWER: A

OTHER FILE FORMATS

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- GIFT
- Moodle XML
- Blackboard
- Blackboard V6+
- Course Test Manager
- Embedded Answers (Cloze)
- Examview
- Hot Potatoes
- Learnwise
- Missing word
- WebCT format

The online tests using quiz module can be configured with any number of questions per subject and any time duration to attempt the test. As far as the performance of network based products is concerned, the concurrency issues are discussed foremost. As per the rule of thumb stated in the manual of Moodle, it can support 50 concurrent users for every 1 GB of RAM depending on specific hardware and software combination.

CONCLUSION

In today's world, the academia is relying on the E-learning products to great extent and delivery the course contents using these platforms. The e-learning market is getting speed and different place for the advancement of higher education model. The software tycoons are developing Open-source e-Learning management platforms more robust and efficient. The development,

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customization and deployment of open-source platforms is a definitely a speedily growing process, and in the near future, the academia will get great windfall.

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